

Contents

1 Routine/Function Prologues	2
1.0.1 agrlwdn.F90 (Source File: agrlwdn.F90)	2

1 Routine/Function Prologues

1.0.1 agrlwdn.F90 (Source File: agrlwdn.F90)

to compute the net downward longwave radiation at the earth's surface.
method:

=====

- calculate the emissivity of the clear sky.
- calculate downwelling longwave radiation of the clear sky.
- add contribution of low, middle and high clouds to the clear sky portion.

process narrative: flux3 - located in the flux3 sdf in dnxm

=====

references:

===== dr idso's paper in the j. of geophys. research,
no 74, pp 5397-5403.

dr r.f.wachtmann's paper in the digest of preprints, topical meeting on remote sensing of the atmosphere, anaheim,ca, optical society of america, entitled, "expansion of atmospheric temperature-moisture profiles in empirical orthogonal functions for remote sensing applications", 1975

INTERFACE:

```
subroutine agrlwdn( sfctmp, e, iclamt, rldown )
```

REVISION HISTORY:

15 may 1988	initial version.....	capt rice/sddc
07 sep 1999	ported to ibm sp-2. added intent attributes to arguments. updated prolog.....	mr gayno/dnxm
25 oct 2001	implement in LDAS.....	jesse meng/ncep

implicit none

INPUT PARAMETERS:

real, intent(in)	:: iclamt (3)
real, intent(in)	:: e
real, intent(in)	:: sfctmp

OUTPUT PARAMETERS:

real, intent(out)	:: rldown
-------------------	-----------

CONTENTS:

```
!
! -----
! executable code starts here...compute the cloud amount
! in fraction of overcast (.1 to 1.0).
```

```
! -----
cldfrt(1) = iclamt(1) / 100.0
cldfrt(2) = iclamt(2) / 100.0
cldfrt(3) = iclamt(3) / 100.0

! -----
! convert vapor pressure units from pascals to millibars for use
! in determining emissivities.
! -----

emb = e * 0.01

! -----
! compute the effective clr sky emissivity for all wavelengths
! (emissa) using idso's equation.
! -----

emissa = 0.700 + (5.95e-5 * emb * exp(1500 / sfctmp))

! -----
! use emissa in wachtmann's model for sky irradiance to calc a
! resultant longwave downward radiation value. first calc a sasc
! emissivity (emissb), which is an adjusted idso emmisivity.
! then use emissb to calculate the blackbody irradiance of the
! clear sky (the 1st term of wachtmann's equation).
! -----

emissb = -0.792 + (3.161 * emissa) - (1.573 * emissa * emissa)
clrsky = emissb * sigma * (sfctmp * sfctmp * sfctmp * sfctmp)

! -----
! now compute the irradiance contribution from the low, middle,
! and hi cloud layers (the 2nd thru 4th terms in wachtmann' eqn).
! -----

lcterm = (80.0 - (5.0 * zl)) * cldfrt(1)
mcterm = (80.0 - (5.0 * zm)) * (1.0 - cldfrt(1)) * cldfrt(2)
hcterm = (80.0 - (5.0 * zh)) * (1.0 - cldfrt(1)) * &
& (1.0 - cldfrt(2)) * cldfrt(3)

! -----
! put it all together to get a resultant downwrd longwave irrad.
! -----

rldown = clrsky + hcterm + mcterm + lcterm

return
```

